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REMARKS

Claims 1-13, 16-19 and 21-26 remain in this application.

In view of the above amendments and the following discussion, Applicants submit that none of the claims now pending in the application are indefinite under the provisions of 35 U.S.C. §112, anticipated under the provisions of 35 U.S.C. §102, or obvious under the provisions of 35 U.S.C. § 103. Thus, Applicants believe that all of these claims are now in condition for allowance.

I. REJECTION OF CLAIMS UNDER 35 U.S.C. § 112

The Examiner rejected claim 21 as being indefinite for failing to particularly point out and distinctly claim the subject matter that Applicants regard as the invention. Specifically, the Examiner stated that claim 21 depends on cancelled claim 20 which renders claim 21 indefinite.

Applicants have amended claim 21 accordingly. Thus, Applicants submit that claim 21, as it now stands, fully satisfies the requirements of 35 U.S.C. § 112.

II. REJECTION OF CLAIMS UNDER 35 U.S.C. §103(a) Claims 1, 6, 8 and 9

A. The Examiner rejected in paragraph 4 of the Office Action claims 1, 6, 8, and 9 as being unpatentable over the Bang et al. International Patent Application (WO 99/20811, published Apr. 29, 1999) in view of the Okamoto et al. (Japanese Patent Publication 2000-252218), Fischer (United States patent 5,422,139, issued Jun. 6, 1995), and Collins et al. (United States patent 6,077,384, issued Jun. 20, 2000). Hereafter this combination of references is referred to as Combination 1.

B. The Examiner rejected in paragraph 6 of the Office Action claims 1, 6, 8, and 9 as being unpatentable over the Shan et al. European Patent Application (EP 0814495 A2, published Dec. 29, 1997) in view of the Okamoto et al. (Japanese Patent Publication 2000-252218), Fischer (United States patent 5,422,139, issued Jun. 6,

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1995), and Collins et al. (United States patent 6,077,384, issued Jun. 20, 2000). Hereafter this combination of references is referred to as Combination 2.

C. The Examiner rejected in paragraph 8 of the Office Action claims 1, 6, 8, and 9 as being unpatentable over the Masuda et al. patent (United States patent 6,171,438 B1, issued Jan. 9, 2001) in view of the Okamoto et al. (Japanese Patent Publication 2000-252218), Fischer (United States patent 5,422,139, issued Jun. 6, 1995), and Collins et al. (United States patent 6,077,384, issued Jun. 20, 2000). Hereafter this combination of references is referred to as Combination 3.

The rejections referred to in Sections A-C above are respectfully traversed.

Bang et al. teach the gas distribution plates 72 and 88 (FIG. 3). Bang et al. do not teach the gas distribution plates 72 and 88 having blind radial grooves.

Okamoto et al. teach a facing plate 6 (gas distribution plate) with a plurality slots (grooves) 8 facing the substrate and a plurality of blow-out holes (apertures) 7 formed through the plate in the area between the slots (i.e., the slots and holes are not connected). The slots 8 are used to control composition of process gases in a peripheral region of reaction volume in a plasma apparatus (Sections [0033]-[0036], FIG. 3). In the embodiment of FIG. 4, the outward end of each slot 8 are coupled to a gas exhaust pipe 12 for exhausting gas from the reaction volume. The holes 7 extending through the plate are for flowing process gases into the reaction volume. Okamoto et al. do not teach blind slots coupled to blow-out holes 7.

Fischer teaches a gas distribution plate 37 with infeed openings 3 communicating to a groove 9 that extends in concentric, radially connected circles. Fischer does not teach the gas distribution plate 37 having blind radial grooves.

Collins et al. teach a flat ceiling 110 having a silicon wafer (gas distribution plate) 985 disposed in a recess 960 (FIGS. 36A and 36B). Collins et al. do not teach any grooves in the silicon wafer 985.

Wicker et al. teach a gas distribution plate 120 having channels 120a extending to the edge of the plate (FIG. 8). Wicker et al. does not teach a central gas feed or blind grooves in the gas distribution plate 120.

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Wu teach a coated composite base (ceiling) 102 having a dome (recess) 106. Wu does not teach any gas distribution plate in the dome 108 or elsewhere.

Shan et al. teach a plasma chamber with a gas distribution plate 44 mounted on the underside of the chamber lid 24 (FIGS. 1 and 3.) Shan et al. do not teach a recess in the chamber lid 24 having or any grooves in the gas distribution plate 44.

Masuda et al. teach a vacuum processing chamber 100 having an electrode 201 or electrode plate 211 (FIGS. 6-7) with gas distribution apertures. Masuda et al. do not teach any grooves in the electrode 201 or electrode plate 211.

The Examiner's attention is directed to the fact that the alleged references, either singly or in any permissible combination, do not teach, suggest, or otherwise render obvious an apparatus comprising a gas distribution plate having a gas distribution plate having a plurality of blind radial grooves in fluid communication with a center gas feed, each groove comprising a plurality of apertures extending through the plate, as recited in Applicants' independent claim 1. Specifically, Applicants' claim 1 positively recites:

"Apparatus for gas distribution in a semiconductor wafer processing chamber comprising:
a roof fabricated from a silicon-based material and having a center gas feed;
a recess disposed within said roof;
a gas distribution plate disposed within said recess and having a plurality of blind radial grooves in a fluid communication with the center gas feed; and
a plurality of apertures disposed within said grooves and extending through the gas distribution plate." (emphasis added).

The Examiner asserts that the grooves taught by Okamoto et al. used in with the gas distribution plate of Bang using the materials taught by Collins in combination with the bores of Fisher to yield the claimed invention. However, as the grooves taught by Okamoto are not blind, nor are the grooves fluidly coupled to a center gas feed and additionally are used to remove gas from the reaction chamber, the grooves as taught by Okamoto cannot be combined with the teachings of Bang, Collins and Fisher to yield a gas distribution plate having a plurality of blind radial grooves in fluid communication with a center gas feed, each groove comprising a plurality of apertures extending through the plate, as recited by claim 1.

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Therefore, Applicants contend that claim 1 is patentable over Combinations 1, 2, and 3 of Bang et al., Okamoto et al., Fischer, Collins et al., Wicker et al., Wu, Shan et al., and Masuda et al. and, as such, fully satisfies the requirements of 35 U.S.C. §103 and is patentable thereunder.

Furthermore, claims 6, 8, and 9 depend, either directly or indirectly, from claim 1 and recite additional features therefor. Since Combinations 1, 2, and 3 of Bang et al., Okamoto et al., Fischer, Collins et al., Wicker et al., Wu, Shan et al., and Masuda et al. would not produce Applicants' invention as recited in claim 1, dependent claims 6, 8, and 9 are also not obvious and are allowable.

III. REJECTION OF CLAIMS UNDER 35 U.S.C. §103(a) Claims 7, 10-13, 16-19 and 21-26

D. The Examiner rejected in paragraph 5 of the Office Action claims 7, 10-13, 16-19, and 21-26 as being unpatentable over the Bang et al. International Patent Application (WO 99/20811, published Apr. 29, 1999) in view of the Okamoto et al. (Japanese Patent Publication 2000-252218), Fischer (United States patent 5,422,139, issued Jun. 6, 1995), and Collins et al. (United States patent 6,077,384, issued Jun. 20, 2000) and further in view of Wicker et al. (United States patent 6,129,808, issued Oct. 10, 2000), and Wu (United States patent 5,910,221, issued Jun. 8, 1999). Hereafter this combination of references is referred to as Combination 4.

E. The Examiner rejected in paragraph 7 of the Office Action claims 7, 10-13, 16-19, and 21-26 as being unpatentable over the Shan et al. European Patent Application (EP 0814495 A2, published Dec. 29, 1997) in view of the Okamoto et al. (Japanese Patent Publication 2000-252218), Fischer (United States patent 5,422,139, issued Jun. 6, 1995), and Collins et al. (United States patent 6,077,384, issued Jun. 20, 2000) and further in view of Wicker et al. (United States patent 6,129,808, issued Oct. 10, 2000), and Wu (United States patent 5,910,221, issued Jun. 8, 1999). Hereafter this combination of references is referred to as Combination 5.

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F. The Examiner rejected in paragraph 9 of the Office Action claims 7, 10-13, 16-19, and 21-26 as being unpatentable over the Masuda et al. patent (United States patent 6,171,438 B1, issued Jan. 9, 2001) in view of the Okamoto et al. (Japanese Patent Publication 2000-252218), Fischer (United States patent 5,422,139, issued Jun. 6, 1995), and Collins et al. (United States patent 6,077,384, issued Jun. 20, 2000) and further in view of Wicker et al. (United States patent 6,129,808, issued Oct. 10, 2000), and Wu (United States patent 5,910,221, issued Jun. 8, 1999). Hereafter this combination of references is referred to as Combination 6.

The rejections referred to in Sections D-F above are respectfully traversed.

Teachings of Bang et al., Okamoto et al., Fischer, Collins et al., Wicker et al., Wu, Shan et al., and Masuda et al. are discussed above in Sections A-C as applied to claims 1, 6, 8, and 9.

The Examiner's attention is directed to the fact that the alleged references, either singly or in any permissible combination, do not teach, suggest, or otherwise render obvious an apparatus comprising a roof and a gas distribution plate coated with a material layer, wherein the gas distribution plate has a plurality of blind radial grooves each comprising a plurality of apertures, as recited in Applicants' amended independent claim 18. Specifically, Applicants' amended claim 18 positively recites:

"Apparatus for gas distribution in a semiconductor wafer processing chamber comprising:

- a roof having a top surface and a bottom surface and having a center gas feed;
- a recess disposed within the bottom surface of said roof;
- a gas distribution plate disposed within said recess and having a plurality of blind radial grooves in a fluid communication with the center gas feed and a plurality of apertures disposed within said grooves, the apertures extending through the gas distribution plate; and
- a material layer coating disposed upon the bottom surface of the roof and the gas distribution plate." (emphasis added).

Support for the amendment can be found in FIG. 4 of originally filed application; no new matter has been entered.

In contrast, the alleged combination of references does not teach or suggest the apparatus comprising a roof and a gas distribution plate coated with a material layer,

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wherein the gas distribution plate has a plurality of blind radial grooves in fluid communication with a center gas feed, each groove comprising a plurality of apertures extending through the plate. Therefore, Applicants contend that claim 18, as amended, is patentable over Combinations 4, 5, and 6 of Bang et al., Okamoto et al., Fischer, Collins et al., Wicker et al., Wu, Shan et al., and Masuda et al. and, as such, fully satisfies the requirements of 35 U.S.C. §103 and is patentable thereunder.

In view of the arguments stated above with respect to Combination 1, 2, and 3 of Bang et al., Okamoto et al., Fischer, Collins et al., Wicker et al., Wu, Shan et al., and Masuda et al. as applied to claim 1, Applicants contend that claim 1 is patentable over the cited art for the same reasons stated above and, as such, fully satisfies the requirements of 35 U.S.C. §103 and is patentable thereunder.

Furthermore, claims 7, 10-13, 16-17, 19, and 21-26 depend, either directly or indirectly, from claims 1 and 18 and recite additional features therefor. Since Combination 4, 5, and 6 of Bang et al., Okamoto et al., Fischer, Collins et al., Wicker et al., Wu, Shan et al., and Masuda et al. would not produce Applicants' invention as recited in claims 1 and 18, dependent claims 7, 10-13, 16-17, 19, and 21-26 are also not obvious and are allowable.

CONCLUSION

Thus, Applicants submit that none of the claims presently in the application are indefinite under the provisions of 35 U.S.C. § 112 or obvious under the provisions of 35 U.S.C. § 103. Consequently, Applicants believe that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.


If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, it is requested that the Examiner telephone Keith Taboada at (732) 530-9404 so that appropriate

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arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

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